Utrecht University

School of Economics

The effects of financial education on financial literacy and savings behavior: Evidence from a controlled field experiment in Dutch primary schools

Utrecht University

School of Economics

The effects of financial education on financial literacy and savings behavior: Evidence from a controlled field experiment in Dutch primary schools

Adriaan Kalwij, Utrecht University
Rob Alessie, University of Groningen
Milena Dinkova, Utrecht University
Gea Schonewille, Nationaal Instituut voor Budgetvoorlichting
Anna van der Schors, Nationaal Instituut voor Budgetvoorlichting
Minou van der Werf, Nationaal Instituut voor Budgetvoorlichting

Sponsor: Dutch Banking Association (NVB)

Background

Financial problems later in life have been linked to the financial situation in adolescence or young adulthood (e.g., Van der Schors and Stierman 2016).

Policymakers agree that financial education should

- start as early as possible (part of basic education).
- precede real life financial decisions,

The psychological literature suggests that (upper) primary school children (Otto et al., 2006; Webley, 2005)

- have an understanding of economics & are able to manage their money,
- and can be taught about personal finance.

Motivation

There is some disagreement on whether financial education

- improves financial literacy (FL),
- leads to better financial decision making.

And it is not yet very clear what kind of programs might work and at what ages.

Previous studies I
Primary schools / controlled field experiments

Kourilsky (1977), a metropolitan area in the US.

Children at the ages of five and six are able to learn about economic concepts such as cost-benefit analysis and scarcity.

Berti and Monaci (1998), Italy.

Third graders can acquire and retain knowledge on the way banks work through a program on the notion of banks.

Previous studies II
Primary schools & controlled field experiments

Go et al. (2012), Oakland (US), fourth and fifth graders.

The Money Savvy Youth program increase financial knowledge.

Sherraden et al. (2011), Midwestern urban elementary school (US), fourth graders.

Financial capabilities are improved due to a financial education program that include getting access to a savings account.

Batty et al. (2015), Wisconsin (US), children in grades 3-5.

Financial education increases their financial knowledge in the short term and also one year later and the probability of saving.

Coda Moscarola and Migheli (2015), Torino (Italy), children aged 8 and 9.

A program on the importance of saving is effective in decreasing the levels of impatience for boys but not for girls.

Contribution to the literature

1. Provide empirical evidence for the Netherlands on the effectiveness of financial education in primary schools using a controlled field experiment.

2. Analyze pre-and posttest responses in relation to the content of the financial education program.

3. Allow the effectiveness of the program to vary by gender and grade.

Our Field Experiment: the Cash Quiz

Our Field Experiment: the Cash Quiz

- 72 primary schools participate, 3773 children. Not a random sample.
- The experiment takes place during “Money Week”: a yearly returning and nationwide event during which special attention is paid to financial education.

Our Field Experiment: the Cash Quiz

- Intervention/treatment: during Money Week, children of the treatment group receive a 45-minutes financial education program called the Cash Quiz.

- About one-third of the schools are in the control group and two-thirds in the treatment group

- Evaluations of children's financial literacy & savings behavior:
  - Pretest: in the week preceding Money Week
  - Posttest: about two to four weeks after Money Week

Our Field Experiment: the Cash Quiz

- 12 Cash Quiz questions covering themes such as the costs of borrowing money, inflation, consumption/saving, institutions, debit card, pay-to-win online games.
- Bank employees act as quizmasters.
- It is played in groups of at most 5 children.
- Children of the group who win most (virtual) money receive plastic bracelets as a prize.
- The setup is in accordance with those developed by the OECD International Network on Financial Education (OECD 2015)

Our Field Experiment: the Cash Quiz (one example)

CQ1, grade 5, version B: A bank is a business that needs to earn money to remain open. Which statement is correct?

1. A bank earns money by selling things such as bankcards.
2. A bank earns money by playing the national lottery.
3. *A bank earns money by lending it and asking for interest in return.*

Grade 5, version A: How does a bank earn money? (open answer)

Grade 6, version B : You saved €80. A part of it you put in your savings account. What does a bank do with the money in savings accounts of its customers?

1. The bank keeps the money in a vault until the customer comes to collect it.
2. The bank gives the money to the government so it can govern the country.
3. *The bank loans the money to other people or business.*

Grade 6, version A: What does a bank do with the money in savings accounts of its customers? (open answer)

Financial literacy: data from pre- and posttest questionnaires

Questions and statements (correct answers in Italic)	Control group, pretest	Control group, pre- to posttest change	Treatment group, pretest	Treatment group, pre- to posttest change
	%	%-point	%	%-point
Q2. How do you call the amount that you see when you open your bank account on a computer or a bank-app? (i) IDEAL (ii*) Balance* (ii) IBAN (ii) Giro (ii) I don't know	42.3	6.5	42.1	8.4
Q3. What is true? Jan borrows money from a bank: (i) Jan has to pay the money he borrowed back *(ii) Jan has to pay the money he borrowed back and he has to pay extra money (interest)* (iii) Jan has to pay a part of the money back. (iv) Jan does not need to do anything. (v) I don't know	63.2	9	58.5	12.9
Q4. Advertisement is forbidden in free online games. (i) True (ii*) False* (iii) I don't know	87.1	2.5	84.4	4.2
Q5. If you play free online games it could be possible you have to pay money. (i*) True* (ii) False (iii) I don't know	57	5.6	58	14.8

Questions and statements (correct answers in Italic)	Control group, pretest	Control group, pre- to posttest change	Treatment group, pretest	Treatment group, pre- to posttest change
	%	%-point	%	%-point
Q6. What is a budget diary? *(i) A book in which you write down all your income and daily expenses* (ii) A book in which you keep all important papers (iii) A book in which you keep all your bills, to make it possible to pay then at once at the end of the month (iv) I don't know	30.4	17.9	26.4	31
Q7. What is the minimum number of euro coins needed to pay €1.25 without needing any change? (i) 2 coins *(ii) 3 coins* (iii) 4 coins (iv) 5 coins (v) I don't know	68.1	9.9	62.4	13.4
Q8. Your sports club needs 20 new balls. Which special offering is cheapest? *(i) One ball costs €20 and each fifth ball is for free* (ii) One ball costs €20 and you get a 10% discount (iii) I don't know	56.1	7	54.9	4.6
Q9. Suppose Minou has €100 euro in her savings account. The interest rate is 2% per year. She leaves the money in her account for five years and does not withdraw money. How much will she have in her savings account after five years? *(i) More than €102.-* (ii) Exactly €102.- (iii) Less than €102.- (iv) I don't know	68.1	1.6	59.1	2.4

The Data from pre- and posttest questionnaires

Explanatory Variables	Girls	Age ≤ 10	Age 11	Age ≥ 12	Grade 6	Receives pocket money	Chores for money	Interest in money matters
	%	%	%	%	%	%	%	%
All groups and times	50.6	31.4	47.5	21.1	46.0	76.0	61.0	23.6
Control group, pretest	52.5	29.1	48.9	22.0	52.8	80.3	60.7	22.1
Control group, posttest	52.2	30.5	49.6	20.0	52.5	80.9	60.5	19.7
Treatment group, pretest	49.7	32.3	47.5	20.3	42.0	73.1	61.3	24.6
Treatment group, posttest	49.9	32.1	45.6	22.3	44.0	75.0	61.1	25.0

Empirical Framework

Associations of financial literacy with background characteristics (t=0,time of the pretest):

$$Y_{i0} = \alpha_0 + X_{i0}^{T} \alpha_1 + \eta_{i0},$$

A treatment model to estimate the effect of the Cash Quiz on financial literacy (t=0,1):

$$Y_{it} = \alpha_i + \theta_1 t + \theta_2 Treatment_i + \beta Treatment_i \times t + \varepsilon_{it},$$

First Difference Least Squares estimator:

$$\Delta Y_i = \theta_1 + \beta Treatment_i + \Delta \varepsilon_i.$$

Empirical results: associations

The results are in line with most previous studies:

- Girls have, on average, fewer correct answers (-0.36).
- Children in grade 6 perform better than children in grade 5 (+1.35)
- Receiving pocket is associated with more correct answers (+0.41)

Econometric issues:

- No evidence of endogenous selection into the treatment or control groups (except for the interest rate question)
- No evidence of endogenous panel attrition

Empirical results: treatment effects

Equations (3)		*Homogeneous*	
n=1452		*treatment effect*	
		p.e.	s.e
Number of correct answers	Treatment	**0.32**	(0.11)
	Trend	**0.60**	(0.09)

Empirical results: heterogeneous treatment effects

Equations (3) & (5)		*Homogeneous*			*Heterogeneous treatment effect*								*Test, H0: homogeneous*	
		treatment effect											*treatment effect*	
n=1452					boys grade 5		girls grade 5		boys grade 6		girls grade 6		*gender*	*grade*
		p.e.	s.e		p.e.	s.e	p.e.	s.e	p.e.	s.e	p.e.	s.e	p-value	p-value
Number of correct answers Q2-Q9	Treatment	**0.32**	(0.11)		0.16	(0.15)	0.38	(0.24)	0.18	(0.21)	**0.51**	(0.15)	0.40	0.87
	Trend	**0.60**	(0.09)		**0.62**	(0.11)	**0.73**	(0.18)	**0.67**	(0.18)	**0.39**	(0.11)		

Empirical results: treatment effects

n=1452	*Treatment effect*	
	p.e.	s.e
Number of correct answers	**0.32**	(0.11)
Q2 Bank balance	0.02	(0.03)
Q3 Loan repayment	0.04	(0.04)
Q4 Advertisement in free online	0.02	(0.02)
Q5 Free online game, always for	**0.09**	(0.04)
Q6 Budget diary	**0.13**	(0.04)
Q7 Euro coins	0.04	(0.05)
Q8 Balls for sports club	-0.02	(0.03)
Q9 Interest rate	0.02	(0.04)

Empirical results:

Heterogenous treatment effects

The null-hypothesis of a homogeneous treatment effect (across gender or grade) is not rejected for all questions.

Exception: Q3 by grade (“loan repayment”; topic is content of the Cash Quiz for grade 5).

Robustness checks

The main findings remain when controlled for

- the level of difficulty of the Cash Quiz,
- whether the pretest has been discussed in class (afterwards),
- whether other materials of Money Week have been used.

Gender differences

The pre- to posttest improvements for girls appear to be driven by learning and not by increased confidence (as measured by “Don’t know” answers).

Empirical results: Savings behavior

Savings behavior (row percentages) Q1: You would like to buy something nice but do not have the money for it. What would you do?		Buy something less nice	Save for it	Ask parents	Don't know	row-sum
All groups and times		1.1	89.9	6.6	2.5	100.0
Control group, pretest		1.4	90.9	5.5	2.2	100.0
Control group, posttest		0.7	90.4	6.1	2.9	100.0
Treatment group, pretest		1.2	88.0	7.8	2.9	100.0
Treatment group, posttest		0.9	91.7	5.6	1.9	100.0

Empirical results: Probability of saving, treatment effect

	p.e.	(s.e.)
All	**0.04**	(0.02)
Boys grade 5	**0.08**	(0.03)
Girls grade 5	**0.07**	(0.03)
Boys grade 6	0.03	(0.04)
Girls grade 6	0.01	(0.03)
Test, H0: homogeneous treatment		
effect, gender; p-value	0.88	
Test, H0: homogeneous treatment		
effect, grade; p-value	0.20	

Main findings I

Of the pre- to posttest improvements in children's financial literacy:

- about one-third can be attributed to the Cash Quiz (the treatment).
- about two-thirds can be attributed to having done the pretest or Money Week events

Main findings II

Significant effects of financial education (the Cash Quiz) on financial literacy are found, and mainly

- for girls, but homogeneous treatment effects are not rejected

- on pre-and posttest questions that are directly related to Cash-Quiz questions (“pay-to-win”,“budget diary” & “loan repayment”).

Main findings III

The Cash Quiz makes children more likely to save for something they want to buy.

- No significant gender differences.

- Appears to holds for fifth-graders and not for sixth-graders, but a homogenous treatment effect is not rejected.

Alternative interpretations of our findings

- A caution concerning the effectiveness of financial education on financial literacy.
  - Primary school children have difficulties applying a (numerical) method in a different context (e.g. “balls for sports club”). This may relate to their cognitive development (Scheinholtz et al. 2012).

- We should perhaps evaluate financial education programs by also measuring changes in the psychological factors related to financial empowerment.
  - Caskey (2006): financial literacy is much about motivation.
  - Batty et al. (2015): financial education is linked to improved student attitudes (toward money issues).